The fauna of No. 3 conglomerate is mixed Cambrian and lower Cambro-Silurian, while that of the associated slaty beds is exclusively lower Cambro-Silurian.

The fauna of No. 4, though also mixed, is chiefly of Trenton Lorraine age, as is that of the associated slates.

The mineralogical and lithological characters of the four groups are as markedly different as are their paleontological features, and the former present a striking correspondence with those which characterize the pre-paleozoic and lower paleozoic formations of the Lake Superior region.

Altogether the structure in the vicinity of Quebec seems to correspond very closely with that described by Mr. S. W. Ford in his 'Observations upon the great fault in Rensselaer county' (*Amer. journ. sc.*, vol. xxix. January, 1885).

In the Quebec area the great fault not only exists, but has many subordinate and more or less parallel branches. The most important of these crosses the main Quebec anticlinal at Danville, in Shipton township, and runs thence south by the Missisquoi valley to Mansonville, in the township of Potton, on the Vermont boundary. In many places these dislocations have, as described by Mr. Ford (*op. cit.*), placed the older rocks on the top of the newer. Such an occurrence is well seen in the gorge of the Nicolet River near Danville, where the black Cambro-Silurian limestones and shales dip directly under gray wrinkled quartzose pre-Cambrian mica-schists, and one would suppose the two series to be in conformable sequence; but not far removed, in the township of Tingwick, a small outlier of the same black limestone rests flat on the upturned edges of the mica-schists, as do other similar outliers elsewhere in the district.

It is quite evident that Appalachian geology can never be satisfactorily interpreted and explained without careful and minute study in the field of the numerous great shoved, more or less parallel, faults by which the whole region has been affected, and due consideration given to the marvellous effects they have produced on the structure.

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Ottawa, Can., March 9.

Notes upon the erosive power of glaciers as seen in Norway.

The above heading is the title of a paper in course of preparation, of which the following is a *résumé* in part: —

(*a*) As many of the Norwegian glaciers are rapidly advancing, they arch over from rock to rock, and leave sub-glacial caverns into which the explorer can go long distances.

(*b*) Numerous angular and sub-angular stones, as well as those rounded by atmospheric erosion, are resting upon the crystalline rocky beds with the ice flowing about them; that is to say, the resistance due to the friction between the stones and the rock is greater than the cohesion of the molecules of the ice, which flow about the obstacles as a viscous body. Even stones resting upon loose and soft morainic matter, over which the glacier is advancing, are sufficient to channel the ice as it moves over, in place of pushing it along.

(*c*) No blocks were seen in the act of being torn up from the subjacent rock, nor were the loose stones being picked up.

(*d*) A large rounded bowlder, held in the ice, was being rolled, in place of shoved, along by glaciers, as shown by the mouldings in the ice. At the same time, it was being crushed.

(*e*) The abrasion by the falling of detached masses of ice and stones is considerable.

(*f*) A tongue of ice, hanging from the roof of a cavern, was pressing against a loose bowlder, that a man could have moved. In place of pushing the stone, or moving around it, the tongue of ice, of about a cubic yard, was being held suspended by a sheet of ice bent backward, nearly at right angles, in a graceful curve.

(*g*) Scratched stones were rarely seen among those falling out of the bottoms of glaciers, and in many places the rocks were scarcely, if at all, scratched. Although occasionally highly polished, the subjacent rocks, even where scratched, showed generally surfaces roughened by weathering, or with only the angles removed.

(*h*) The upper layers of ice were seen to bend and flow over the lower, wherever low barriers were met with, in place of the lower strata being pushed up by an oblique thrust.

(*i*) A glacier was advancing into a morainic lake, and, in part, against the terminal barrier. In place of ploughing up the obstruction, the strata of ice were forced up into an anticlinal, along whose axis there was a fracture and fault. Thus domes of ice covered with sand were produced. The sand had been deposited upon the surface of glaciers by the waters of the lake. The conformability of the sand and the strata of uplifted ice was undisturbed, except along the line of fault. As the domes melt, cones of sand with cores of ice are left. By the lifting process the morainic barrier is covered with clayey sand, as if subjacent strata had been ploughed up by the glacier, of which there was no evidence.

(*j*) At several places where glaciers are advancing over moraines, they are levelling them, and not ploughing them out. This levelling process is by the dripping of the water from the whole under surface. In fact, even the loose stones upon the water-soaked moraines were sufficient resistance to cause the bottom of the ice to be grooved.

(*k*) The fall of a great ice-avalanche from a high snow-field, down a precipice of a thousand feet, to the top of a *glacier rémanié* was seen. These falling masses of ice bring down the frost-loosened stones from the sides of the mountains upon the glacier, which is charged with *detritus*. It is this material which furnishes mud to the sub-glacial streams, and not the rocky bed of the valley worn down by glacial erosion.

(*l*) One does not find that the glaciers *per se* are producing hummocks. These are the result of atmospheric and aqueous erosion, although perhaps beneath a glacier, which sweeps over them, and to some extent scratches and polishes them. The effects of glaciation in removing angles and in polishing surfaces are small compared with atmospheric erosion upon the same rocks.

(*m*) The transporting power of glaciers is limited to the *débris*, which falls upon its surface from overhanging or adjacent cliffs, and afterwards works through the mass or comes to be deposited at its end.

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University of Missouri, Feb. 28.